

REMARKS

Claims 1-4 are all the claims pending in the application.

Applicants have amended the specification as mentioned above in order to remove the rejection under 35 U.S.C. § 132. The current paragraph 12 of the specification has been returned to the state it was prior to the October 16, 2003 Amendment.

Reconsideration and removal of the rejection of claims 1-4 under 35 U.S.C. § 103(a) as obvious based on a combination of Asakawa (U.S. Patent No. 5,117,109) and Onishi (U.S. Patent No. 5,449,902) are respectfully requested on the basis of the present amendment to the claims and the following remarks.

The Examiner rejects claims 1-4 under 35 U.S.C. § 112, second paragraph, as indefinite because the term “orthogonal” has not been defined in the specification. From the following explanation, it is believed that the Examiner will appreciate background information on the separation mechanism of the claimed invention. At paragraph 6 of the original specification of the present application sets forth as follows:

Using a combination between independent multiple systems based on orthogonal separation modes (such as ion exchange mode vs. reverse phase mode), it may be expected that the utilization of the different selectivity between target analytes and matrix contaminants will produce a much better separation. Because liquid chromatographs have only a single liquid flow path, it is necessary that multiple orthogonal systems be combined with columns and mobile phases integrated into one liquid chromatograph system.

The term of “orthogonal” means the concept of the expectation of the enhanced effect of separation capability by the utilization of the different, non-interplaying selectivity based on the different type of interactions as mentioned at paragraph 6 of the original specification. In this

meaning, the physical or chemical separation mechanism on the first analytical column may not interact with the separation mechanism on the trapping and/or the second analytical column. In other words, since the mobile phase solution for the first analytical column may not interfere with the physical or chemical reciprocal reaction between the materials and the trapping and/or second analytical column, the sample solvent eluted from the first analytical column can be loaded onto the trapping column without any kind of treatments. In this regard, the dilution mechanism using sample loop and additional solvent delivery system as taught by Asakawa is not needed for the Applicants' invention. For this reason, the concept taught by the Asakawa patent is quite distinct from that of the claimed invention.

In Onishi, the sample dilution mechanism is used because the sample correction on the trapping column and/or the separation on the second analytical column can be affected by the mobile phase for the first analytical column. Onishi is not intended for use in the multi-dimensional separation, which uses orthogonal two separation mode, based on a profiling method enabling the system to simultaneously separate and detect as many multi-components as possible in one sample at one analysis running.

Further, Onishi shows the valve mechanism on which plural trapping columns can be mounted, several flow pathway configurations and its control mechanism. However, since the system of Onishi has just one analytical column, Onishi is quite distinct from the present claimed invention where the system is utilized for achieving multi-dimensional chromatographic separation.

Furthermore, the references disclosed in the present specification teach switching valves utilized for achieving multi-dimensional chromatographic separations, as defined in the present invention. No suggestion is made in those references of a system having the mechanism of changing a plurality of trapping columns successively, without intermitting the flow on the 1st system, while eluting sample components from the 1st analytical column. By the same token, while both Asakawa and Onishi disclose an online pre-treatment, such as desalting, neither of the patents discloses a feature of trapping elutants from the 1st analytical column by switching plural trapping columns successively, independently of the separation operation in the column, without intermitting the flow of mobile phase. Thus, none of the references or their combination teach or suggest all the claim limitations, as mentioned above.

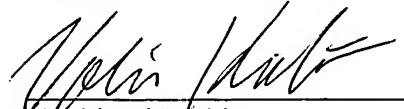
In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

AMENDMENT UNDER 37 C.F.R. § 1.116
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Respectfully submitted,



Yoshinari Kishimoto
Registration No. 47,327

SUGHRUE MION, PLLC
Telephone: (202) 293-7060
Facsimile: (202) 293-7860

WASHINGTON OFFICE

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